

REMARKS

This communication is in response to the Action of December 6, 2005. In that Action, claims 1 through 16 were rejected.

The Examiner first rejects claims 1 through 5, 7 and 8 under 35 U.S.C. 102 as being anticipated by U.S. Patent 5,153,482 to Keijser, et al. The Examiner appears to contend that every element of claim 1, and every element of the claims depending thereon other than one of those dependent claims, are described in this Keijser reference. With this contention, the applicants must respectfully disagree.

Indeed, to support an anticipation rejection, every element of the claims so rejected must be found in the cited single prior art reference upon which such a rejection is based. Here, there is a major difference between the elements set forth in claim 1 and the contents of this Keijser reference. Claim 1 specifically requires that a sodium halide material be present in the discharge chamber. The Keijser reference, on the other hand, makes no mention whatsoever of a sodium halide, nor of any halide for that matter, and thus cannot be anticipatory of claim 1 and so not anticipatory of the claims dependent thereon. In these circumstances, the applicants respectfully submit that claim 1 and the claims dependent thereon are clearly allowable over this Keijser reference insofar as to any anticipation thereby, and that, therefore, this rejection cannot stand.

The Examiner next rejects claims 6 and 9 through 16 under 35 U.S.C. 103 as being obvious in face of the foregoing Keijser reference taken in view of a second Keijser reference provided by U.S. Patent 6,300,729 to Keijser, et al. The Examiner here appears to contend that the first Keijser reference, the '482 patent, discloses everything recited in claim 1 for purposes of rejecting claim 6 depending on claim 1, and discloses everything recited in claim 9, with the exception in both instances of cerium halide, and that the second Keijser reference, the '729 patent, can be obviously combined with the first Keijser reference to result in cerium halide being obvious to add into a discharge chamber with the constituents therein of this first Keijser reference. With this contention, the applicants must respectfully disagree.

The Examiner appears to assume that the lamp of the '482 patent can be operated just as indicated in that reference even with the addition of the cerium halide of the '729 patent thereto, and through such operation still obtain the emission light output due to the sodium but with a further increase in light output from the emission of the cerium due to the provision now of the cerium halide therein. However, to emit light, the cerium halide related components in a arc discharge vessel must support a significantly larger portion of the voltage drop between the electrodes of the lamp thereacross than does the sodium because there must be sufficient energy to, first, disassociate the cerium halide compound into its constituent elements, and then there must also be sufficient energy to ionize the resulting cerium metal species. This will prove impossible because sodium has one of the lowest ionization potentials of the elements and therefore will result in a corresponding voltage drop that is only a very small portion of the voltage supplied between the electrodes in the arc discharge chamber. The remainder of the supplied voltage must be dropped across the mercury vapor in the chamber, and a very substantial amount of mercury vapor must be present to keep the electrical current through the chamber at acceptable values commensurate with using the lamp in the installed commercial electrical grid-system.

Thus, the sodium will ionize to result in some portion of the supplied voltage being dropped across it with the remainder being dropped across the mercury vapor as electrical current is caused to flow through the discharge chamber. The higher energy needed to have the cerium emit light will never be reached because the voltage dropped across the sodium vapor will be small enough to prevent a substantial enough voltage to be reached across the cerium halide above the voltage portion dropped across the mercury vapor to thereby cause the cerium related components disassociate and ionize. That is, the sodium voltage drop will limit the voltage available to be dropped across the cerium related components to a value too small to cause such disassociation and ionization..

In these circumstances, the adding of cerium halide from the '729 reference to the constituents in the discharge chambers of the lamps of the '482 reference will have no effect on the amount of emitted light from those chambers during lamp operation. Indeed, there is little likelihood

of finding lamp systems having an arc discharge chamber containing significant amounts of the pure metal sodium and also significant amounts of halides to form an operating lamp.

As indicated above, the small portion of the voltage supplied to the lamp that is dropped due to sodium in the discharge chamber in a high pressure sodium discharge lamp requires, relatively, that a very large amount of mercury must be provided in the chamber as the basis over which most of the voltage drop across the lamp electrodes is to be supported. This is confirmed in the '482 patent where there is nearly three times as much mercury as there is of sodium, on a weight basis, in the lamp discharge chamber. Such a relatively large amount of mercury thereby leads to much higher mercury vapor pressures in the discharge vessel during operation of the lamp of that patent as compared to the vapor pressures of mercury in the discharge chamber of the lamps of the present application. This situation is in direct contrast to the goal clearly stated in the present application of reducing the amount of mercury, and so its vapor pressure, in the discharge chamber during operation of the lamp as a part of the avoidance of the bending of the discharge arc towards a discharge vessel wall during such lamp operation that results in limiting the operational duration of the lamp. Such a limiting of the mercury content in the discharge chambers of the lamps of the present invention is the basis for operating the lamps with less than 110 V rms across the chambers as claimed.

Hence, as indicated above, the amount of mercury in the discharge vessel of the '482 patent in providing the high-pressure sodium lamp therein cannot be reduced with sodium also present therein if electrical current values through the lamp are to be kept in an acceptable range, and any cerium halide added thereto will not emit with sodium present. On the other hand, the '729 patent, in direct contrast to the present application, describes operating the discharge vessel with a voltage greater than the maximum voltage set forth in the present claims. In achieving this, the '729 patent relies on a substantial mercury vapor pressure by incorporating significantly greater amounts of mercury by weight in the discharge vessels than is described for the present invention. In contrast to both of these references, the present invention describes reducing the mercury content in the arc

discharge chamber to help avoid too great an amount of bending of the discharge arc during lamp operation thereby resulting in relatively smaller voltages being dropped across the chamber.

Thus, there is no motivation whatsoever for one skilled in the art to add any cerium halide of the '729 reference to the discharge vessel constituents in the high-pressure sodium lamp of the '482 patent to thereby provide a better performing lamp since there is no way to operate the resulting lamp so that the cerium metal emits any light. Furthermore, both the '482 and the '729 patents load much greater amounts of mercury into the arc discharge vessels in the lamps described therein leading to much higher mercury vapor pressures in those vessels as compared to the arc discharge vessels of the present invention directly contradicting the teachings of the present application. The present invention, instead, reduces the relative amount of mercury in the arc discharge vessel to keep the voltage there across below 110 V rms to aid in avoiding too much discharge arc bending which is in direct contrast to the '729 patent teaching of keeping the voltage above that value across the arc discharge vessels therein.

The '482 patent lamp does certainly operate at a lower voltage than 110 V rms, but only because it has a relatively large amount of mercury and a pure metal species in the arc discharge chamber constituents. A user, however, must, as a result, accept an emitted light of a much less desirable color that is far from meeting the desire for lamp emitted light being, or nearly being, a white light, a result which follows from sodium being the only light emitting chamber constituent because there are no halides can be used therein to significantly add other colors to thereby make the cumulative emitted light more white as is done in metal halide lamps. In these circumstances, the applicants respectfully submit that claim 6 and claims 9 through 16 are clearly allowable over the Keijser references taken either alone or in combination.

In view of the foregoing, the Applicants respectfully request the Examiner reconsiders rejection of the claims, and further requests these claims now be allowed.

The Commissioner is authorized to charge any additional fees associated with this

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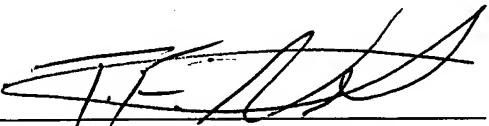
paper or credit any overpayment to Deposit Account No. 11-0982.

Any inquiries regarding this application should be directed to Theodore F. Neils at (612) 339-1863.

Respectfully submitted,

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